"Discovery of Sound in the Sea" Website

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http://www.dosits.org

LONG-TERM GOALS

The long-term goal of this effort is to produce a resource to educate the public on the basic science of sound in the sea and how it is used to communicate, navigate, and explore the oceans.

OBJECTIVES

The objective of this effort is to develop and maintain a website that includes content on how people and marine animals use sound in the sea and educational materials on the foundation of physical science in underwater acoustics (Figure 1).

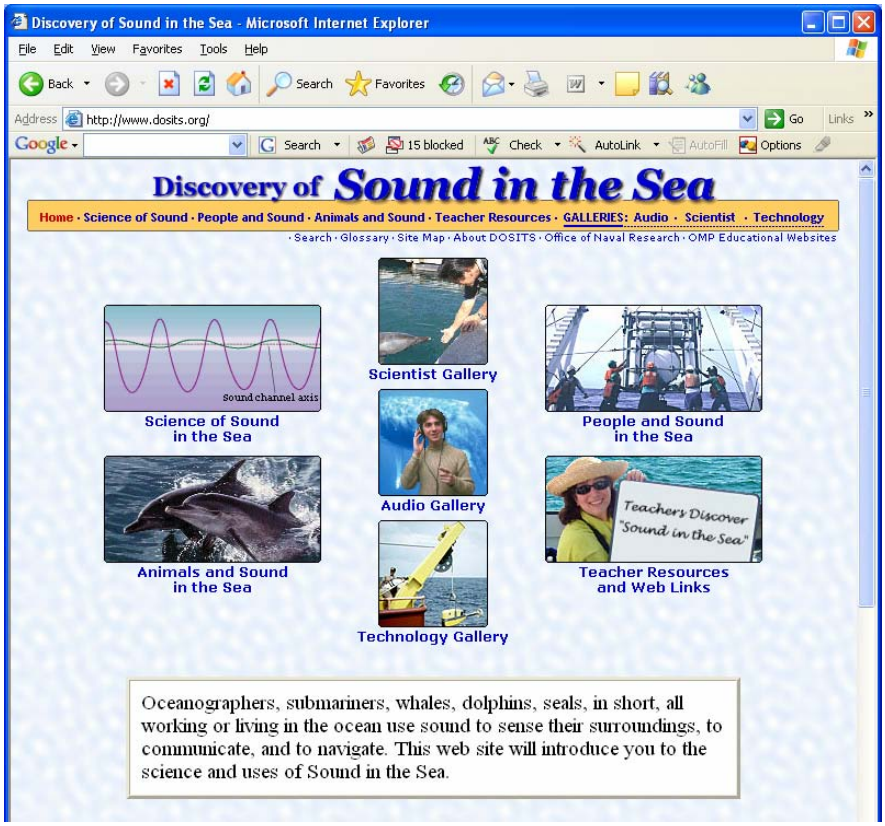

Figure 1: Front page of "Discovery of Sound in the Sea" website (http://www.dosits.org)

Report Documentation Page

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14. ABSTRACT
The long-term goal of this effort is to produce a resource to educate the public on the basic science of sound in the sea and how it is used to communicate, navigate, and explore the oceans.

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**Same as Report (SAR)**	**6**	

APPROACH

Efforts have focused on enhancing and expanding the first version of the website that was launched in November, 2002. During the past three years, Marine Acoustics, Inc. (MAI) has developed a successful working relationship with the University of Rhode Island's Office of Marine Programs (OMP). This relationship involves MAI drafting content material and providing technical guidance for OMP staff to produce additional science content and educational materials focused on sound in the sea and the effects of sound on marine animals. The quality of material on the website is enhanced by an advisory panel and external peer review.

WORK COMPLETED

During the third year of research, MAI focused on several tasks to enhance and expand the first version of the website that was launched in November, 2002. These tasks included the following:

- Adding a page on the Scientific Method to the Advanced Topics section. While the scientific method is the foundation of science, the general public has not been indoctrinated in the process. This section was designed to introduce the basic reader to the scientific method as a process for investigating and testing discoveries about the natural world. It walks through each of the steps of the scientific method, concluding with a discussion about theories and the inherent uncertainty that exists in science.

- Adding a page on Wavelengths in the Science of Sound\How do you characterize sounds? section. Wavelength is a common characteristic used to describe sounds. In this page, it is described in detail and related to the frequency of the sound. This page prepares the reader for discussion of how sound moves, where wavelength/frequency are important considerations.

- Revising and expanding the "Effects of Sound" web pages in the Animals and Sound in the Sea section (Figure 2). Research on the effects of underwater sound on marine animals is an area of concentrated scientific effort. These advances were incorporated into the revised web pages, along with information on additional species and topics. Because temporary threshold shift (TTS) is such a complex subject, and there is very detailed research into the occurrence of this hearing impairment, this topic was transformed into an Advanced Topic, with links from the Hearing Loss page that describes this issue at a more general level. In addition, the pages on the effects of sound on marine animals were divided into separate pages on the effects on marine mammals and the effects on fishes. The pages on the effects on fishes were then augmented with additional information and current research results. Pages were also added to the Effects of Sound section describing research approaches to determining if a sound source might affect an animal and possible mitigation measures for reducing or eliminating the effect of sound on marine animals.

Figure 2: Front page of the Animals and Sound in the Sea section (http://www.dosits.org/animals/intro.htm) [list of the web pages included in the Animals and Sound in the Sea section]

- Creating the Jeopardy activity. This is an educational activity that uses information on the website as "answers," requiring participants to give the "questions" as in the popular TV game show. A basic level and an advanced level of the game were created for teachers to use as a fun activity to assess students' understanding of the website's content. The Jeopardy activity is included on the CD.

- Producing a CD. The CD contained the revised version of the website for use while not connected to the internet, and PowerPoint files of the major sections of the website for teachers to use in their classroom. The PowerPoint files covered the website sections of Science of Sound in the Sea, People and Sound in the Sea, Marine Mammals and Sound in the Sea, Fish and Invertebrates and Sound in the Sea, the Name That Sound activity, and the Jeopardy activity, and were accompanied by Word documents that included teaching notes and suggestions.

- Conducting peer review of the website. A review meeting with the advisory team was held at URI during October 2004 and January 2005 to review the draft revised version of the website. Dr. Peter Worcester from Scripps Institution of Oceanography, Dr. Kurt Fristrup from Cornell University, Dr. James Miller from the University of Rhode Island, Dr. Maya Tolstoy from Lamont-Doherty Earth Observatory, and Dr. Rodney Rountree from the University of Massachusetts participated in the October meeting. Drs. Peter Worcester and James Miller also participated in the January meeting, along with Dr. Peter Scheifele from the University of Connecticut and Dr. Susan Parks from Cornell University. All sections of the website except the Audio Gallery underwent peer review during this time period.

- Presenting the website at the National Science Teachers Association (NSTA) annual conference in Dallas, Texas, March 31 - April 3, 2005. OMP and MAI personnel presented the website during an hour-long workshop and distributed CDs at the Exhibitors Hall, reaching over 15,000 attendees to the conference.

RESULTS

The "Discovery of Sound in the Sea" website has received an incredible response. It was first launched in November, 2002. During 2003 and 2004, the site logged over 3 million "hits." This level of traffic is outstanding and exemplifies the public and academic need for the information presented on the website.

IMPACT/APPLICATIONS

The "Discovery of Sound in the Sea" website is a resource for educating the public on the basic science of sound in the sea and how it is used to communicate, navigate, and explore the oceans. By providing information in one comprehensive site in an easily accessible format, teachers can bring this content into their classrooms; public affairs personnel can inform themselves of controversial issues; and the public can begin to include science in their decisions.

TRANSITIONS

The results of research done under this task are being used to further enhance and expand the website. Future work includes producing two printed publications, a tri-fold pamphlet and an educational brochure, to reach additional audiences and further enhance understanding of sound in the sea; adding web pages on the SOFAR channel, the sonar equation with descriptions of active and passive sonar, and an introduction to signal levels; adding any newly published research to the website, particularly in the effects of sound section; and facilitating peer review of website material that is new, revised, or had not previously been reviewed. Primarily this includes bringing in a fish expert from Dr. David Mann's laboratory at the University of South Florida to review and edit the fish web pages and contacting subject matter experts to review the Audio Gallery web pages.

RELATED PROJECTS

The University of Rhode Island's Office of Marine Programs (OMP) is funded under a separate award for their participation in the "Discovery of Sound in the Sea" project.

REFERENCES

N/A

PUBLICATIONS

“Discovery of Sound in the Sea” website
“Discovery of Sound in the Sea” CD-ROM

PATENTS

N/A